fortune to be present at the examination which raised you to the position you now hold in the University, and because I then ventured to predict that you were one for whom a bright future was in store. I now, with pleasure, see you realize a portion of that hope on the present occasion, and most sincerely do I trust that this is only the harbinger of more extensive and brighter triumphs yet to come.

Professor Jellett read a communication from Joseph Patton, Esq., Professor of Mathematics and Natural Philosophy in Elphinstone College, Bombay, on Hygrometry, and Dalton's Theory of Mixed Gases.

The object of the author in this paper is to controvert the ordinary theory that the particles of different gases have no mutual action. Commencing with the case of aqueous vapour suspended in the atmosphere, he adduces several considerations to show that the known tension of vapour at the surface of the earth could not be accounted for on the supposition that vapour is only compressed by vapour.

Thus, for example, the difference between the average elastic force of vapour at Bombay and Mahabaleshwar is equivalent to ·276 inch of mercury. The height of the latter place above Bombay is about 4500 feet, consequently this difference in the elastic force ought to be produced by the vapour contained in a column of air 4500 feet high. But even if we suppose that through the entire extent of this column the dew-point is 85°, the same as at the base, a supposition which would evidently greatly exaggerate the amount of vapour, Professor Patton shows that the pressure of such a column of vapour would give, for the difference between the tensions at the two places, but ·114 inch of mercury, not half the actual difference.

Similar conclusions are deduced from the observations of Humboldt, which extend to an altitude of nearly 20,000 feet. From these observations Professor Patton reasons as follows: Taking the dew-point, as observed by Humboldt, at the se-

veral heights, 0, 3281, 6562, 9843, 13,124, and 16,405 feet, and assuming, as the most unfavourable supposition, that throughout the entire column, between two points of observation, the dew-point is the same as at the base, he finds the total amount of vapour in a column 19,686 feet high. To this he adds one-fourth, as the amount of vapour existing above the highest point, and thus obtains the total amount of vapour existing in the entire atmospheric column.

The pressure of such an amount of vapour would only produce, at the base of the column, a tension corresponding to a dew-point of 47°, the actual dew-point being 81°. Professor Patton infers, therefore, that the actual tension of the vapour at the surface of the earth cannot depend solely upon the amount of *vapour* by which it is pressed. The same conclusion is deduced from the observations of M. Guy Lussac.

Professor Patton confirms this conclusion by arguments drawn from the meteorological phenomena of the tropics. He asserts that the hygrometer gives no indication of the moisture which produces the tremendous tropical rains, amounting sometimes to ten inches within twelve hours.

In further confirmation of his views, as to the mutual action of gases, the author adduces the following argument:—If vapour exerts no pressure upon dry air; and if we can by any means cut off the lowest stratum of vapour, we should thus diminish the total pressure by the weight of the vapour existing in the atmospheric column. Acting on this principle, Professor Patton takes a bent glass tube, both ends of which are open and turned upwards. Into this tube he pours a small quantity of mercury, having previously filled one arm nearly to the bottom with powdered chloride of calcium. The effect of this substance being to render the air which is in contact with it perfectly dry, Professor Patton argues that, according to the ordinary theory, the atmospheric vapour can exert no pressure upon the mercury in that side. Hence, the mercury in the two arms of the tube ought to show a diffe-

rence of level corresponding to the weight of the vapour contained in the atmospheric column. No such difference, however, could be perceived, the mercury standing at precisely the same height in both columns. From all these considerations, the author infers that the amount of vapour in the atmospheric column is not given by the Hygrometer.

Passing from the case of vapour to that of gases in general, the author adduces certain experiments for the purpose of showing that different gases do press upon one another. Thus, for example, if a tube filled with phosphorus and cotton be inserted tightly into the neck of a bell-jar filled with water, and inverted upon a pneumatic trough, and if the air be admitted through an opening in the tube, the air so admitted will be deprived of its oxygen before it comes into contact with the water. The phosphoric acid being absorbed by the water, the pressure on the water in the jar is due only to the tension of the nitrogen and carbonic acid present in the atmosphere. If, then, oxygen did not press upon these gases, it is plain that this tension ought to be less than the atmospheric pressure. But as the water stands at the same height in the jar and in the trough, it appears that there is no such difference.

Professor Patton has also accounted for the law of Mariotte, as applied to mixed gases, by the supposition that caloric is the force which repels the particles of a gas from each other. Admitting the truth of this hypothesis, let p, p', p'' be the pressures of three different gases, v, v', v'' the volumes which are subsequently mixed, and n, n', n'' the numbers of molecules contained in the several units of volume. We have then

$$p = kn, \quad p' = kn', \quad p'' = kn'',$$

k being a coefficient depending upon the temperature, and therefore the same for all. If now these three gases be mixed in a vessel whose volume is V, the number of molecules contained in a unit of volume of the mixture will be

$$\frac{vn + v'n' + v''n''}{V},$$

and the pressure of this mixture on a unit of surface will be, as before, $k \times$ number of molecules in the unit of volume. Hence, denoting this pressure by P, we shall have

$$P = k \frac{vn + v'n' + v''n''}{V};$$

and therefore

$$VP = vp + v'p' + v''p'',$$

the same expression as that deduced under the supposition of non-mutual action.

Mr. Haughton mentioned that Mr. Patton, the author of the last paper, had forwarded to him a sum of money to provide a European collection of rocks and fossils, for the purpose of promoting the advancement of science among the Hindoos.

The Secretary exhibited an ancient circular piece of bronze, containing figures on both sides, the property of Mr. Quinn, of Belfast.

The Rev. J. H. Todd, D.D., Secretary, exhibited an ancient ecclesiastical bell, and read a letter from John Bell, Esq., of Dungannon, relative to it. The bell is the property of Mr. M'Clelland, of Dungannon, who has kindly permitted it to be exhibited to the Academy. It is said to have been found in the cabin of a poor fisherman, at Fahan, six miles north-west of Derry, on Lough Swilly, in Innishowen, and was recently purchased by Mr. M'Clelland. Fahan, or Fahan-mura, was a monastery, dedicated to St. Murus or Muranus, and founded by St. Columba (Colgan, Trias Thaum., p. 495 and 510). St. Murus, second Abbot of this house, flourished in the beginning of the seventh century, and from the fame of his sanctity has since been reputed its patron. Of the relics preserved in this monastery, Colgan mentions a MS. life of St. Columba, in Irish metre, written by St. Murus himself; a chronicle, also